MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2018/2019

PMT0101 – MATHEMATICS I

(Foundation in Information Technology)

28 MAY 2019
2.30 P.M. – 4.30 P.M.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 6 pages with **FIVE** questions.

2. Attempt **ALL** five questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the answer booklet provided. All necessary working steps **MUST** be shown.

4. **No calculators are allowed**.

5. **You are required to write proper steps.**

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QUESTION 1 [10 marks]

a) Simplify the expression and write your final expression as a fraction with no negative exponents. Show proper steps.

$$\frac{\left(8a^3b^5\right)^{-\frac{1}{3}}}{\left(a^{\frac{1}{2}}b\right)^{-4}}$$

[2 marks]

b) Rationalize the denominator for $\frac{12}{\sqrt{15}-3}$ and simplify.

Leave your final answer as $a+b\sqrt{c}$ where a, b and c are integers.

[2 marks]

c) Simplify the following expression completely.

$$\frac{9x^2-1}{x^2-9}\cdot\frac{3x-9}{9x^2+6x+1}$$

[3 marks]

d) Express $\frac{1}{1-3i}-\frac{1}{3+i}$ in the form $a+bi$, where a and b are real numbers.

[3 marks]

Continued...

QUESTION 2 [10 marks]

a) Solve the equation $\frac{x^2 - x}{2} = 3$. [2 marks]

b) Solve the equation $\sqrt{3+x} = x+1$. Remember to check your answers.

[3 marks]

c) Solve the inequality $\frac{x-2}{(x+4)(x+1)} \geq 0$.

Show clearly your Sign Diagram and give your final answer in interval notation.

[3 marks]

d) Solve the inequality $|3x-7| > 4$. Give your final answer in interval notation.

[2 marks]

Continued...

QUESTION 3 [10 marks]

a) Consider the function $f(x)=\frac{1}{x+3}+5$.

i) State the domain of $f(x)$ in interval notation.

ii) Find the value of x for which $f(x)=6$.

[2.5 marks]

b) Consider the functions $g(x)=\sqrt{x}$ and $h(x)=x^2-4x$.

Find $(h\circ g)(x)$.
Hence, evaluate $(h\circ g)(9)$.

[2.5 marks]

c) Given the polynomial function $f(x)=x(x+5)^3(x-3)^2$.

i) What is the **degree** of f?

ii) Determine **the zeros** of f **and their multiplicities.**
Also, determine whether the graph of f crosses or touches the x-axis at each zero.

iii) Determine its y-intercept.

iv) Determine the end behavior of f.

v) Sketch the graph of the polynomial function.
Make sure your graph shows all intercepts and exhibits the proper end behaviour.

[5 marks]

Continued...

QUESTION 4 [10 marks]

a) Consider a quadratic function $f(x) = -x^2 - 5x + 4$.

i) Write the quadratic function in the standard form $f(x) = a(x-h)^2 + k$ where a, h and k are some constants.

ii) Determine the vertex and the y-intercept of the graph of $f(x) = -x^2 - 5x + 4$.

iii) Sketch the graph of $f(x) = -x^2 - 5x + 4$.
Indicate clearly the vertex and the y-intercept of the graph.

[5 marks]

b) Solve the following equations.

i) $8^{2x+1} = 16^{2x-3}$.

ii) $\log_2 x + \log_4 x = 6$.

[5marks]

Continued...

QUESTION 5 [10 marks]

a) Find an equation of a straight line that passes through point (12, 5) and is parallel to the straight line $4x+3y=6$. Leave your final answer in the form $y=mx+c$, where m and c are constants.

[2 marks]

b) Given an equation of a circle $x^2+y^2+18x+14y+105=0$.

i) Express the equation in the form $(x-h)^2+(y-k)^2=r^2$ where h, k and r are constants.

ii) Find the radius and centre of the circle.

iii) Use discriminant, b^2-4ac to determine whether the circle passes through x-axis or not.

[5 marks]

Continued...

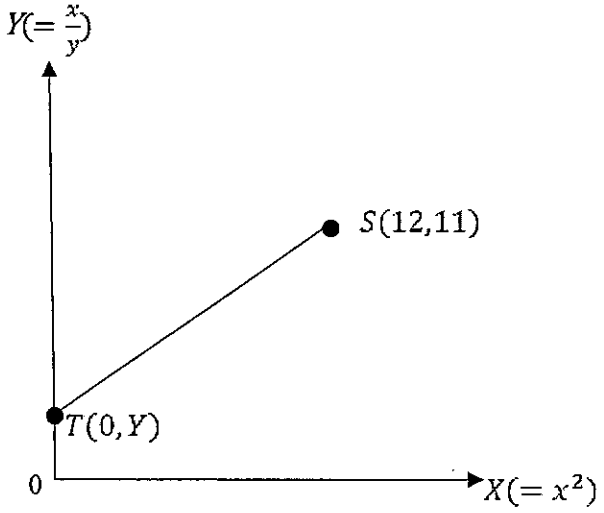
c) The diagram below shows a straight line obtained by plotting $Y\left(=\frac{x}{y}\right)$ against $X\left(=x^2\right)$.

It is given that the gradient of TS is $\frac{3}{4}$ and the point T lies on Y-axis.

i) Find the coordinates of point T.

ii) Express y in terms of x.

[3 marks]



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